

Investigating the mediating role of online learning motivation in the COVID-19 pandemic situation in Bangladesh

Md. H Asibur Rahman¹  | Mohammad Shahab Uddin²  | Anamika Dey¹

¹Department of Business Administration, Faculty of Business & Social Science (FBSS), Bangladesh University of Professionals (BUP), Dhaka, Bangladesh

²Department of Management, University of Chittagong, Chittagong, Bangladesh

Correspondence

Md. H Asibur Rahman, Department of Business Administration, Faculty of Business & Social Science (FBSS), Bangladesh University of Professionals (BUP), Mirpur Cantonment, Dhaka-1216, Bangladesh.
Email: asibur.rahman@bup.edu.bd

Abstract

The purpose of this paper is to investigate the mediating role of online learning motivation (OLM) in the COVID-19 pandemic situation in Bangladesh by observing and comparing direct lectures (DL), instructor–learner interaction (ILI), learner–learner interaction (LLI), and internet self-efficacy (ISE) as predictors of OLM and online learning satisfaction (OLS). Data were collected from 442 undergraduate and graduate students from more than 35 universities in Bangladesh. To test the hypotheses, the PLS-SEM approach was applied using SmartPLS 3.0. The study shows a significant mediating role of OLM between the independent variables and learning satisfaction. In addition, DL, ILI, and ISE are shown to be significant predictors of student satisfaction. The findings have a number of valuable implications for education policy makers, universities, instructors, and students. Moreover, the study suggests some new research perspectives to overcome the limitations of this research and to gain precise knowledge on students' learning motivation and satisfaction regarding other online classes for different categories of students (e.g., high school and college, professional, and PhD).

KEYWORDS

Bangladesh, COVID-19, interactions, learning motivation, learning satisfaction, online education

1 | INTRODUCTION

In December 2019, Wuhan, in Hubei province, China, was the origin of an epidemic known as COVID-19, or the corona virus disease (C. Wang, Horby, Hayden, & Gao, 2020). The Chinese health authorities took immediate action to control the disease and started isolation of people, close monitoring of contacts, epidemiological and clinical data collection from patients, and diagnostic and expansion of treatment procedures (C. Wang et al., 2020). Considering the intensity and seriousness of the epidemic, the World Health Organization (WHO) officially declared the COVID-19 outbreak a pandemic on 12 March 2020 (World Health Organization, 2020). Nine months after the start of the pandemic, the world is still struggling to control the spread of the virus, and WHO has warned that the second wave of the virus could be more devastating than the first. Lockdown is continuing in different parts of the world and has changed almost all aspects of

people's lives. The world is now facing a new reality, including changes to our education, health, politics, business, and economy. One of the most devastating effects of COVID-19 has been on the educational sector. All over the world, educational institutions have been forced to stop their operations to contain the spread of the virus, and schools, colleges, and universities have now been closed for a long time. Educational institutions are introducing online education so that the students can continue their studies at home. All over the world, the demand for online classes has been increasing. Allen and Seaman (2010) found that in the United States around 66% of institutions reported that the demand for new online courses and programmes was increasing. In another study, it was found that around 73% of educational institutions reported that the demand for existing online courses and programmes was also increasing (Harris & Martin, 2012). Although these studies were carried out 10 years back, it is still very much relevant in pandemic situations. One of the reasons

for the increase in demand for online learning is the fast increase in internet use in education (Bates, 2019; Wei & Chou, 2020). However, the COVID-19 situation has intensified the drive towards online education, and like other developing countries, Bangladesh is attempting to adapt to such education both in public and private educational institutions. According to the study by Bao (2020), the five most important areas of online education during COVID-19 that higher educational institutions must address are highly integrated online instructional design and student learning, efficient and effective delivery of online classes, sufficient support from faculties and administration, participation and group discussion among students, and back-up plans for technological interruptions. On the other hand, COVID-19 poses various challenges to online learning, such as poor online teaching facilities, lack of experienced teaching staff, information gaps, and adverse home environments (Zhang et al., 2020). With regard to student satisfaction, T. Chen et al. (2020) suggest that personal factors have no direct impact during the COVID-19 situation; however, the availability of technology and platforms are the most important factors that influence student satisfaction.

There are more facets of online education that could be considered in the pandemic situation, but we are interested in examining the most important factors of online education, such as the mediating role of online learning motivation (OLM), instruction, interaction, and perceived self-efficacy, which are the antecedents of student satisfaction with online education. Before the COVID-19 era, 90% of students in Bangladesh took part in face-to-face or traditional classes. As online classes are a reality now, in order to implement an online learning environment, it is important to know the satisfaction level of students. According to Harris and Martin (2012), students' motivation for choosing online programmes is easy access to online classes, convenience, and flexibility. They further state that it is important to retain students in online education by meeting their needs using online platforms (Harris & Martin, 2012). According to Heyman (2010), there are three areas that are important for retaining students in online classes: student support and student connection with the institution; quality of interaction between faculty and students (interactions); and student self-discipline. On the other hand, regarding online learning, Street (2010) identified "significant external factors such as course structure and support (instructions), person factors such as self-efficacy and autonomy, and academic factors such as time and study management". From these studies, it can be seen that there are several variables that are outside the control of institutions employing face-to-face learning systems (Harris & Martin, 2012); for example, self-efficacy and course structure can have a positive impact on online learning.

Information and communication technology (ICT) helps and facilitates online learning, and its use is increasing day by day. There are many advantages that ICT brings, such as the use of synchronous technology including real-time communication between learners and instructors or among learners; instant replies from instructors to students' questions; reduced travel time; and experience of a real classroom environment (Kuo et al., 2014). Different studies have found that ICT improves students' interaction with their peers and

instructors, which ultimately helps to increase their satisfaction (Kuo et al., 2014; Q. Wang, 2008). Student satisfaction leads to higher motivation to take online classes. Wei and Chou (2020) found that students' computer/internet self-efficacy and motivation for learning demonstrated a direct, positive effect on their online conversation/discussion scores and satisfaction with courses. In addition, they also found that internet self-efficacy (ISE) for online learning inclination had a mediating effect on online learning perceptions and satisfaction.

As COVID-19 is imposing a new reality on education, we firmly believe that this study will help policy makers to take immediate actions to implement online education. We also strongly believe that the study will contribute in five significant areas. First, we have examined the mediation effect of OLM, which in turn has motivated us to develop a new model of student's satisfaction with regard to the pandemic situation; to date, to the best of our knowledge, no study has been conducted in the context of Bangladesh that relates directly to interactions/lecture and student satisfaction. Therefore, we believe that this is an important research direction during the crisis period of COVID-19, especially in the context of Bangladesh. Second, the study discusses one of the most important antecedents of online learning, namely instructor-learner interaction (ILI), which has a profound effect on the choice of online learning. Third, the study fills the knowledge gap by explaining the importance of learner-learner interaction (LLI) and its effect on student satisfaction. Fourth, the study assesses the importance of ISE, which has an impact on online education as well as on student satisfaction. No other studies have considered this issue (ISE) in the context of COVID-19 with regard to Bangladesh. We believe that our study provides new insights into ISE, which will also contribute to the literature on online education. Finally, the findings of this study will help future researchers and policy makers to integrate and formulate course design, improve ILI, implement appropriate platforms for online learning, including the issue of student motivation, and provide policy implications to tackle the post-COVID-19 educational challenges, especially for developing countries such as Bangladesh.

To achieve the above objectives, we developed the theoretical background of online learning through literature review, explained all the keywords, and then developed our model and hypotheses. To test our hypotheses, we developed a questionnaire and collected data, and then tested the model. We discuss the results, and finally suggest policy implications and future research directions.

2 | LITERATURE REVIEW

2.1 | Online learning satisfaction

Student satisfaction plays a significant role in achieving the vision and mission of universities (Muhsin et al., 2019). Student satisfaction has been defined as the feeling or outlook of students towards their instructional or educational activities (Gee, 2018). The attitude of learners towards their learning experience is reflected by their satisfaction (Alqurashi, 2016; J. C. Moore, 2005).

Student satisfaction is considered to be one of the central components for identifying the attributes of online learning (Bekele, 2010; Soffer & Nachmias, 2018). Various factors, such as attitudes, knowledge, process and facilities, motivation, learning environment, and learning outcomes, have been found to have an impact on learning satisfaction (Listyaningrum et al., 2016; Muhsin et al., 2019). In addition, the performance of the teacher, course appraisal, and ILI have an important influence on student satisfaction (Ali & Ahmad, 2011; Gee, 2018). Promoting the whole comprehensive education of learners, as well as providing insight, is the purpose of education. To achieve this purpose, universities need to continually gather information about student satisfaction (Betz et al., 1971; Gee, 2018), which is not only a significant determinant of programme and learner-related outcomes but also a positive demonstrator of learners' perceived learning skills (Kuo et al., 2013; Liao & Hsieh, 2011). It is important to consider student satisfaction because of its contribution to academic performance (Biner et al., 1997).

The conventional face-to-face education system is no longer considered to be the only mode of distributing knowledge (Tan et al., 2016). Studies have shown that, because of its originality and convenience, the trend towards online classes is flourishing (Allen & Seaman, 2010; Eom et al., 2006). Various terms such as "online education", "e-learning", "distance learning", "distance education", and "online learning" are used to explain ICT-based modes of learning. Among these, online education is the most broadly used term (Lee, 2010). In this study, the terms online learning, online education, online courses, and online classes are used interchangeably. Online learning represents education in which the whole syllabus is offered through an online course delivery system. Learners can take part irrespective of location, time, or place (Harris & Martin, 2012). It is a method of learning in which students and teachers are physically segregated by distance, by time, or by both (Liaw, 2008; Liaw et al., 2007). In online education, the subject matter of the course is offered to learners through computers using internet technology (Lee, 2010).

Online learning offers more independence to pupils or students to take part in the learning process or to communicate with their peers (Kuo et al., 2013). By means of synchronous and asynchronous communication technologies, it fosters quality and quantity of communication between learners, teachers, and classmates (Wei & Chou, 2020). According to researchers, the quality as well as quantity of online communication with instructors has a much greater influence on the advancement of learning and satisfaction than with conventional face-to-face communication in classes (Lee, 2010).

Assessing learners' satisfaction with online courses is important. Such satisfaction is based on multiple factors, such as course composition, instructional functions, and syllabus, as well as the instructors' learning and assistance, appearance and feedback, and teaching style (Eichelberger & Ngo, 2018; Wei & Chou, 2020). Among these, perhaps the role of instructors' feedback is most crucial in the recognition of online learning and students' satisfaction with online classes (Lee, 2010). Four factors have been indicated to be connected to the satisfaction of students with online classes: ILI and communication,

length of time spent on activities, effective and devoted learning, and collaboration among peers (Gray & DiLoreto, 2016). In addition, studies indicate that learners who are enrolled on online classes become more contented and motivated when explanations of the purpose of the course and course requisites offered by instructors are explicit, when the learning atmosphere is cooperative, when there is a high level of communication between learners and teachers, and when significant feedback is given to the participants (Soffer & Nachmias, 2018; Toven-Lindsey et al., 2015).

2.2 | Direct lectures and online learning satisfaction

Garrison et al. (2000) define direct lecture (DL) as "any teaching provided directly or indirectly by the instructors in the form of lectures, video or audio lessons, synchronous and asynchronous sessions, constructive and explanatory feedback provided, and the selection and inclusion of course references and resources (textbook, readings, supplemental materials, videos, etc.)". An instructor not only performs the task of designing and organizing a course but also plays a role as a facilitator, social supporter, technology facilitator, and assessment designer (Goh et al., 2017). However, the establishment of their own presence and personality in the course content, discussions, and activities is considered to be the most important role of instructors in online learning environments (Gray & DiLoreto, 2016). In order to maintain students' motivation towards learning, instructors provide support and perform multiple tasks in the teaching process, including developing the course structure and providing feedback regarding students' performance (Goh et al., 2017), can discuss personal narratives relevant to the course content in live sessions, and also make quick replies to students' queries (Gray & DiLoreto, 2016; Shea & Bidjerano, 2010).

Attainment of excellent academic achievement by satisfied students is the outcome of quality instructors. By teaching efficiently, high-quality instructors can produce high-quality students (Gee, 2018). In addition, Osman and Saputra (2019) found that the teaching style of instructors has an important effect on student satisfaction and can be considered as a determinant of programme quality. Qualified instructors are capable of creating a pleasurable experience as well as generating meaningful learning for students who are engaged spontaneously. Students' level of understanding and other skills will continue to improve through achievement of significant engagement with the learning method (Muhsin et al., 2019). Finally, another factor influencing student satisfaction is teaching staff who have higher levels of commitment to the student learning experience (Muhsin et al., 2019; Poon & Brownlow, 2015).

2.3 | Instructor-learner interaction and online learning satisfaction

ILI has been defined as two-way communication that takes place between course instructors and learners (Kuo et al., 2014). Guiding,

supporting, evaluating, and encouraging learners are some of the different types of ILIs (Kuo et al., 2014; M. G. Moore, 1989). ILI takes place when the instructor is involved in delivering knowledge and information, as well as encouraging learners, providing them with timely feedback, and facilitating clear collaboration (Goh et al., 2017). As direct communication between the two parties is absent in online learning, instructors' reactions and feedback are vital. Learners also place emphasis on such feedback, as it demonstrates whether they are heading in the right direction (Alqurashi, 2016). By providing formative feedback, instructors can create cooperation with learners, which affirms how they are accomplishing their tasks, and clarify the ways to make progress (Gray & DiLoreto, 2016). To enhance interaction with learners, instructors are motivated to post messages on discussion boards on a regular basis and make quick responses to student queries (Herrington et al., 2006; Kuo et al., 2014).

ILI is a fundamental element of the online course experience and has a powerful influence on learner outcomes and learner satisfaction (Burnett et al., 2007; Kuo et al., 2014). Ali and Ahmad (2011) found ILI to be the strongest variable that makes a significant contribution to learner satisfaction. High-quality and frequent interaction between students and their instructors also results in high student satisfaction and perceived learning rates. Kuo et al. (2014) found ILI to be the second most powerful predictor that contributes to learner satisfaction (Gray & DiLoreto, 2016). Such interaction has also been found to have a greater effect on satisfaction and perceived learning than learner-learner interaction (LLI) (Yang et al., 2016).

2.4 | Learner-learner interaction and online learning satisfaction

Researchers have highlighted the significance of interaction (Alqurashi, 2018; Kuo et al., 2013, 2014), and LLI is one of the strongest predictors of student satisfaction and success in online courses (J. Moore, 2014). Such interaction encompasses mutual communication among learners, whether or not their instructors are present (Kuo et al., 2014). Moreover, LLI ensures the exchange of ideas and feedback between students (Elizondo-Garcia & Gallardo, 2020). It is especially significant for online learning environments when course curricula are formative and learner-centred (Tawfik et al., 2017). LLI is crucial to ensure a better online learning experience and can improve learners' academic success (Elizondo-Garcia & Gallardo, 2020; Kurucay & Inan, 2017). Kuo et al. (2014) assessed certain variables that could have an impact on student satisfaction in online learning. They found that LLI failed to predict such satisfaction in online learning environment. However, other researchers have found that LLI is significantly related to satisfaction with online courses among undergraduate students (Kurucay & Inan, 2017). Moreover, LLI has been shown to be the main predictor of student satisfaction in distance learning environments (Bolliger & Martindale, 2004). Similar findings have been found by other researchers (Tawfik et al., 2017).

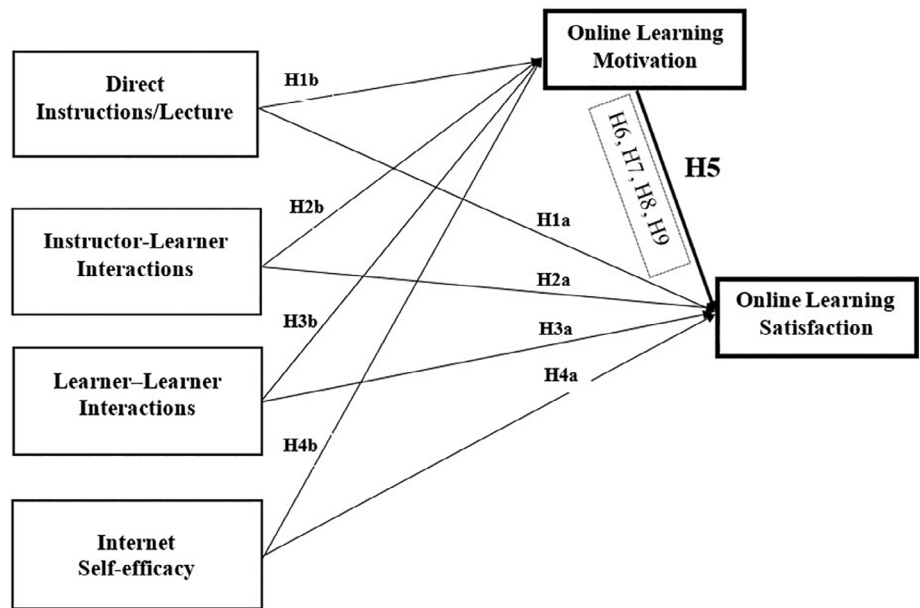
2.5 | Internet self-efficacy and online learning satisfaction

Self-efficacy is a significant factor not only for learning but also for determining the learning satisfaction of students (Alqurashi, 2018). In his self-efficacy theory, Bandura (1977) defines it as individuals' personal judgement regarding their capability to accomplish challenging tasks at a high level or to achieve success in an action in a specific domain (Tseng et al., 2020; Vayre & Vonthron, 2019). The theory has important implications for online learning (Puzziferro, 2008). Thus, students with self-efficacy can confidently understand essential academic tasks, set standards for the accomplishment of significant tasks, and be more responsible for ensuring progress towards the attainment of the academic objectives (Alghamdi et al., 2020). Previous research on online learning environments in tertiary education settings has frequently focused on the technological segment of self-efficacy, such as internet self-efficacy (ISE) (Alqurashi, 2019; Kuo et al., 2014). ISE denotes individuals' confidence in their capability to organize and perform activities to complete a required task using the Internet (Kuo & Belland, 2019). ISE directs individuals to use the Internet to solve problems and achieve expected objectives (P. C. Hsu et al., 2020). Moreover, students who have low ISE may have less engagement with online systems or content due to a lack of confidence (Kuo et al., 2014; Shi et al., 2011).

Students' belief in the ease of use of the Internet has a significant influence on online course satisfaction (Wei & Chou, 2020). Liang and Tsai (2008) found that in an online learning environment, learners with high ISE were more satisfied, as they could explore more resources and expand their knowledge. In addition, in online courses, students' ISE was a significant predictor of their satisfaction (Alqurashi, 2018; Kuo et al., 2014). Similarly, students' ISE had a direct impact on course satisfaction (Prifti, 2020; Wei & Chou, 2020). Furthermore, Alqurashi (2020) identified that online self-efficacy was a powerful predictor, as well as a vital contributor, to perceive satisfaction in online learning.

2.6 | The mediating role of online learning motivation

In the context of the COVID-19 pandemic, adopting e-learning has become the only way of transmitting knowledge worldwide, as social distancing is the only way to reduce the spread of the disease (Biswas & Debnath, 2020). However, learners' motivation plays an important role in such adoption (Zhou, 2016; Zhu et al., 2020). Generally, motivation refers to the incentive that leads someone to act spontaneously (Keskin & Yurdugül, 2020). A number of studies have pointed out that learners' motivation is a noticeable factor affecting learning outcomes (Brooker et al., 2018; H. C. K. Hsu et al., 2019). Moreover, researchers have demonstrated a strong connection between the motivation to learn online and participants' success and engagement in online learning settings (Keskin & Yurdugül, 2020). Furthermore, several scholars Ryan & Deci, 2000 have employed self-determination theory (SDT) to study students' behavioural intention to participate and learn in online learning environments (H. C. K. Hsu

FIGURE 1 Research framework and hypotheses

et al., 2019; Huang et al., 2019; Zhou, 2016; Zhu et al., 2020). SDT is a comprehensive framework for understanding aspects that can facilitate or weaken intrinsic motivation, psychological well-being, and autonomous extrinsic motivation directly connected to educational settings (Ryan & Deci, 2020). Similarly, to explain the relevance of SDT to online learning, Zhu et al. (2020) argue that learners' ability to control their own thoughts, motivation, and learning behaviour may provide necessary insights into how self-motivated learners can influence their online learning efforts.

There are many empirical evidences which indicate that DL, ILI, LLI, and ISE are important predictors of student satisfaction in online learning (Alqurashi, 2018; Kuo et al., 2014, 2010; Muhsin et al., 2019; Prifti, 2020; Tawfik et al., 2017; Wei & Chou, 2020). Moreover, online-based DL can impact students' OLM (Thai et al., 2017). ILIs influence both intrinsic and extrinsic student motivation in the learning process (Goh et al., 2017), and LLIs enhance students' OLM (Kuo et al., 2014). Furthermore, self-efficacy has an impact on student learning motivation and learning outcomes (Kuo et al., 2014; Liang & Tsai, 2008). Previous studies have found that ISE has an influence on learner motivation (Kuo et al., 2014; Liang & Wu, 2010). Additionally, learning motivation directly influences learning satisfaction (Chang & Chang, 2012). As these studies fulfil the requirement of investigating the mediating role of learning motivation between the independent variables and student satisfaction, this study is designed to examine the possible mediating role of students' learning motivation in the relationship between DL, ILI, LLI, and ISE and student learning satisfaction.

3 | RESEARCH HYPOTHESES AND FRAMEWORK

Based on the above discussion of the related theories and studies, the following hypotheses have been developed. In addition, based on

these hypotheses, the research framework has been developed (see Figure 1).

H1 _a	: DL has a positive relationship with OLS.
H1 _b	: DL has a positive relationship with OLM.
H2 _a	: ILI has a positive relationship with OLS.
H2 _b	: ILI has a positive relationship with OLM.
H3 _a	: LLI has a positive relationship with OLS.
H3 _b	: LLI has a positive relationship with OLM.
H4 _a	: ISE has a positive relationship with OLS.
H4 _b	: ISE has a positive relationship with OLM.
H5	: OLM has a positive relationship with OLS.
H6	: OLM will mediate the relationship between DL and OLS.
H7	: OLM will mediate the relationship between ILI and OLS.
H8	: OLM will mediate the relationship between LLI and OLS.
H9	: OLM will mediate the relationship between ISE and OLS.

4 | RESEARCH METHOD

4.1 | Participant characteristics

Initially, as part of a developing country, Bangladeshi universities faced tremendous challenges to ensure the provision of online classes in order to complete the course curriculum during the COVID-19 outbreak. One of the main reasons behind the problem was that universities were not well equipped to go online. In addition, high-speed internet facilities (broadband and cellular data) and the necessary devices (laptops and smartphones) needed to participate in online

classes are not available to students because of excessive device cost and student's location of residence. A few universities have taken initiatives to continue with online classes to compensate for the loss of face-to-face classes. However, such initiatives remain questionable in terms of students' satisfaction with online classes. Therefore, the target population of this research are undergraduate and graduate students from both public and private universities in Bangladesh who have been participating in online classes during the COVID-19 pandemic.

4.2 | Research setting and procedure

This is a cross-sectional study, as we collected data at a specific point in time, namely the COVID-19 outbreak. To collect the data, an online questionnaire was designed using Google Forms. The language of the questionnaire was English. Initially, the online form was circulated to the instructors teaching online classes, most of whom were selected through personal contacts. The form was then shared with students using social networking sites such as Facebook and WhatsApp and by direct emails. Participation in this survey was voluntary, and data collection was conducted between 1 June 2020 and 23 July 2020, which was indicated as the peak period of COVID-19 cases in Bangladesh by experts. In total, 462 fully completed questionnaires were returned by respondents representing more than 35 universities throughout the country. However, the researchers rejected 3.03% ($N = 14$) of the responses because of duplication, which might have resulted from network errors during submission by the respondents. In addition, some biased responses (same ratings given for all the items) were also deleted. Overall, 4.33% responses were excluded. Finally, 442 fully and correctly completed responses were taken into consideration for the final analysis and discussion.

4.3 | Measurement tools

The first part of the questionnaire asked respondents questions regarding their demographic profile. Particulars included data on their gender, current educational level, nature of their university, the faculty in which they were conducting their studies, current residential area (urban or rural), age group, the devices they used to participate in online classes, the internet facilities they were using, and, finally, who was bearing the cost of their internet data/connections. The second part of the questionnaire called for responses to items regarding both the proposed independent and dependent variables. To investigate the research objectives, multi-item scales were adopted to ensure the correct measurement of each variable. To measure DL, ILI, and LLI, three, six, and eight items, respectively, were adopted from Kuo et al. (2014). To measure ISE, three items were adopted from Liaw (2008).

A number of recent studies have investigated students' learning satisfaction in online settings. However, there is no theoretical basis or related scale that could be used in this research setting. Wei and Chou (2020) developed a seven-item scale to measure students'

satisfaction with online courses, which was adopted for this study. Moreover, to measure student motivation, 13 items were used, 7 of which were adapted from Harris and Martin (2012) and the remaining 6 were added to the scale based on expert opinions and recently published articles on COVID-19 and online higher education. All the measurement items are shown in Appendix. To avoid ambiguity and to make the questionnaire more credible for the respondents, some wording changes were made to rephrase the items. The participants were asked to respond to all the items on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree).

5 | ANALYSIS AND FINDINGS

The Statistical Package for Social Sciences (SPSS) version 23 was used to perform the descriptive statistical analysis. In addition, SmartPLS3 was also employed for the partial least squares (PLS) path modelling to evaluate both the measurement and structural model.

5.1 | Respondent profile

The demographic profile of the respondents ($N = 442$) was as follows: 64.70% of the respondents ($N = 286$) were male students, and 35.30% ($N = 156$) were female; 86.40% ($N = 382$) were at undergraduate/honours level, and only 13.60% ($N = 60$) were taking graduate/Master's programmes. Of these, 52.90% ($N = 234$) were studying in private universities and the remaining 47.10% ($N = 208$) in government-supported public universities. In this sample, 58.82% ($N = 260$) of the respondents were students with a business and economics background; 14.71% ($N = 65$) were from social sciences and law; 11.76% ($N = 52$) from engineering; and 5.42% ($N = 24$) from arts. The remaining students were from different faculties, including medicine and life sciences, information and communication technology, and education research. Regarding location distribution, 63.6% ($N = 281$) were from urban areas, and 36.4% ($N = 161$) from rural areas.

In terms of age group, most of the learners (59.30%; $N = 262$) were in the 21–23 year age group, 21.30% ($N = 94$) were >24 years old and 19.50% ($N = 86$) were <18 years old. Most of the students used smartphones (74.90%; $N = 331$), 21.50% ($N = 95$) were using laptops, 3.20% ($N = 14$) had desktop computers, and the remaining students were using other devices to participate in online classes. In terms of internet access in order to participate in online classes, 47.30% ($N = 209$) used a broadband connection, although most of the learners (52.70%; $N = 233$) used mobile data/cellular data. In Bangladesh, such data is costlier than broadband/cable connections.

Finally, the most significant finding was that, in terms of managing costs related to data connection and devices, 98.6% ($N = 436$) of students paid themselves to participate in online classes. This finding is significant because the current economic condition of most families in the country is not strong enough (Ahamed, 2020) to cover the high cost of participating in online classes during the COVID-19 pandemic (Jasim & Sajid, 2020).

5.2 | Measurement model

Convergent validity was inspected by considering the item loading of the variables and the average variance extracted (AVE). As shown in Table 1, loadings for all the items were above the 0.50 level recommended by Hair et al. (2010). However, to obtain the final loadings

and AVE, one item (OLM10) from the OLM construct was deleted because of too low and insignificant loadings. The AVEs of DL, ILI, LLI, ISE, OLM, and OLS were 0.841, 0.537, 0.557, 0.891, 0.570, and 0.736, respectively. Therefore, the measurements used demonstrated adequate convergent validity, as the AVE for all of them was above 0.50 (Hair et al., 2010; Henseler et al., 2014; Igbaria et al., 1995).

TABLE 1 Internal consistency, reliability and convergent validity

Construct	Measurement item	Outer loading	AVE	CR	CA α	rho_A
Direct lecture (DL)	DL1	0.910	0.841	0.941	0.906	0.906
	DL2	0.931				
	DL3	0.911				
Instructor–learner interaction (ILI)	ILI1	0.705	0.537	0.873	0.825	0.835
	ILI2	0.683				
	ILI3	0.739				
	ILI4	0.779				
	ILI5	0.636				
	ILI6	0.834				
Learner–learner interaction (LLI)	LLI1	0.759	0.557	0.909	0.886	0.894
	LLI2	0.768				
	LLI3	0.721				
	LLI4	0.676				
	LLI5	0.748				
	LLI6	0.695				
	LLI7	0.773				
	LLI8	0.818				
Internet self-efficacy (ISE)	ISE1	0.937	0.891	0.961	0.939	0.940
	ISE2	0.948				
	ISE3	0.947				
Online learning motivation (OLM)	OLM1	0.791	0.570	0.940	0.930	0.937
	OLM11	0.811				
	OLM12	0.732				
	OLM13	0.836				
	OLM2	0.717				
	OLM3	0.851				
	OLM4	0.829				
	OLM5	0.605				
	OLM6	0.670				
	OLM7	0.803				
	OLM8	0.734				
	OLM9	0.632				
Online learning satisfaction (OLS)	OLS1	0.868	0.736	0.951	0.940	0.942
	OLS2	0.911				
	OLS3	0.860				
	OLS4	0.853				
	OLS5	0.839				
	OLS6	0.779				
	OLS7	0.886				

TABLE 2 Discriminant validity using the Fornell–Larcker criterion

Construct	Mean	SD	DL	ILI	ISE	LLI	OLM	OLS
Direct lecture (DL)	3.298	0.958	0.917					
Instructor–learner interaction (ILI)	3.352	0.749	0.738	0.732				
Internet self-efficacy (ISE)	2.964	1.184	0.624	0.591	0.944			
Learner–learner interaction (LLI)	3.332	0.769	0.569	0.709	0.603	0.746		
Online learning motivation (OLM)	3.003	0.894	0.648	0.635	0.806	0.659	0.755	
Online learning satisfaction (OLS)	2.794	1.000	0.705	0.690	0.778	0.654	0.853	0.858

Note: The values in italics and bold on the diagonal represent the square root of AVE, while the other entries represent the correlations.

TABLE 3 Assessment of discriminant validity using HTMT

	DL	ILI	ISE	LLI	OLM	OLS
DL						
ILI	0.843					
ISE	0.676	0.666				
LLI	0.625	0.823	0.652			
OLM	0.701	0.715	0.858	0.713		
OLS	0.762	0.775	0.826	0.706	0.902	

Note: Criterion discriminant validity is established at $HTMT_{0.90}$.

Moreover, the values of composite reliability (CR) ranged from 0.873 to 0.961, which was higher than the recommended cut-off value of 0.70 (Hair et al., 2017). Cronbach's alpha (CA) measures the internal reliability of items. In this case, the CA values for all the constructs were above 0.825, which indicates a good level of reliability, as the threshold level is 0.70. Furthermore, the Dijkstra–Henseler indicator (ρ_A) was over the 0.7 cut-off value. Consequently, the reliability criteria were met both at item and construct levels (Hair et al., 2019).

We then inspected discriminant validity, that is, the degree to which a construct is distinct from others (Hair et al., 2010). To assess this, the intercorrelations between the measures of hypothetically overlapping constructs were inspected (Table 2). The correlational values among the constructs (diagonal elements denoting the square root of AVE) were much greater than with the other constructs (off-diagonal elements). Therefore, this indicates good discriminant validity (Fornell & Larcker, 1981). In the case of the discriminant validity of the measures, item cross-loading was also assessed and found to be acceptable, and hence all the constructs were found to have satisfactory discriminant validity except the discriminant validity between DL and ILI.

Henseler et al. (2014) proposed the heterotrait–monotrait ratio of correlations (HTMT) as a relatively new approach to assess discriminant validity in SEM. To assess this using HTMT, a threshold value of 0.85 has been proposed (Kline (2015)), while other researchers recommend a value of 0.90 (Gold et al., 2001; Hair et al., 2019). Therefore, in this paper the constructs meet the threshold, as the value of HTMT is <0.90 as suggested by Gold et al. (2001) and Hair et al. (2019), and

as shown in Table 3. In summary, all the constructs demonstrate very strong reliability and validity.

5.3 | Structural model evaluation

A series of regression equations were used to estimate the structural model coefficients for the relationships between the constructs. In assessing structural relations, collinearity must be inspected to ensure that it does not produce bias in the regression results; the variance inflation factor (VIF) is often used to evaluate the collinearity of the exogenous constructs (Hair et al., 2019; Memon et al., 2017). Hair et al. (2014) suggest a cut-off value of 5.0 for VIF, while Hair et al. (2019) recommend that VIF scores should be close to 3, with lower values desirable. In this case, the VIF values for each construct were below the threshold value of 5.0 and very close to 3, which shows that collinearity issues between the constructs were absent. The structural model inspects the underlying relationships between the constructs (Memon et al., 2017). In our study, the bootstrapping technique (resampling = 5,000, minimum) was applied to assess the statistical significance of the path coefficients (Hair et al., 2017). The relationships between endogenous and exogenous variables were examined at a significance level of 0.05 ($p < 0.05$).

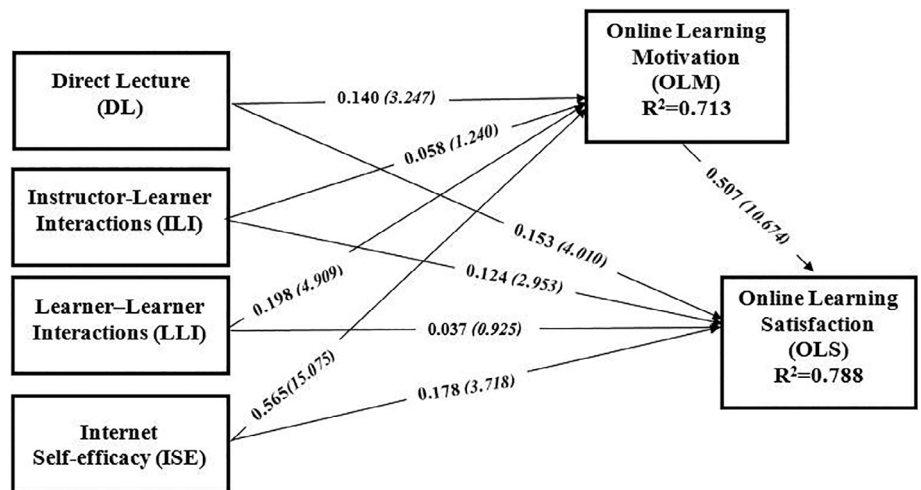
From Table 4 and Figure 2 with regard to direct relationships, it is observed that almost all the exogenous variables have a positive and statistically significant relationship with the endogenous variables as hypothesized, apart from hypotheses H2_b (ILI → OLM) and H3_a (LLI → OLS). Specifically, ILI (H2_b: $\beta = 0.056$, $t = 4.010$, $p > 0.01$, BCI LL: −0.038, UL: 0.141) was not significantly related to OLM. In addition, LLI (H3_a: $\beta = 0.036$, $t = 0.925$, $p > 0.01$, BCI LL: −0.041, UL: 0.114) was not significantly related to OLS.

The mediating effect of OLM was investigated to establish whether it mediated the relationships between DL, ILI, LLI, ISE, and OLS. OLM (H6: $\beta = 0.071$, $t = 3.019$, $p < 0.01$, BCI LL: 0.029, UL: 0.121) mediated the relationship between DL and OLS, while OLM (H7: $\beta = 0.029$, $t = 1.244$, $p > 0.01$, BCI LL: −0.020, UL: 0.072) did not mediate the relationship between ILI and OLS. In addition, OLM (H8: $\beta = 0.101$, $t = 4.357$, $p < 0.01$, BCI LL: 0.059, UL: 0.151) mediated the relationship between LLI and OLS. Finally, OLM (H9: $\beta = 0.288$,

TABLE 4 Result of the structural model assessment for direct relations

H	Relation	Std. β	SE	t-values	p-values	BCI LL	BCI UL	f^2	VIF	Decision
1 _a	DL \rightarrow OLS	0.152	0.038	4.010	0.000	0.078	0.229	0.043	2.560	S
1 _b	DL \rightarrow OLM	0.140	0.044	3.147	0.002	0.055	0.229	0.027	2.492	S
2 _a	ILI \rightarrow OLS	0.124	0.042	2.953	0.003	0.045	0.206	0.024	3.034	S
2 _b	ILI \rightarrow OLM	0.056	0.045	1.240	0.215	-0.038	0.141	0.004	3.023	NS
3 _a	LLI \rightarrow OLS	0.036	0.039	0.925	0.355	-0.041	0.114	0.003	2.382	NS
3 _b	LLI \rightarrow OLM	0.198	0.040	4.909	0.000	0.122	0.281	0.061	2.245	S
4 _a	ISE \rightarrow OLS	0.178	0.048	3.718	0.000	0.081	0.272	0.049	3.042	S
4 _b	ISE \rightarrow OLM	0.566	0.038	15.075	0.000	0.490	0.637	0.576	1.930	S
5	OLM \rightarrow OLS	0.509	0.048	10.674	0.000	0.414	0.599	0.348	3.487	S

Abbreviations: BCI LL, confidence intervals bias-corrected at lower limit; BCI UL, confidence intervals bias-corrected at upper limit; NS, not supported; S, supported.

FIGURE 2 Structural model representing path coefficients, t- values, and R^2 **TABLE 5** Results of the structural model assessment for specific indirect effects

H	Relation	Std. β	SE	t-value	p-value	BCI LL	BCI UL	Decision
H ₆	DL \rightarrow OLM \rightarrow OLS	0.071	0.024	3.019	0.003	0.029	0.121	S
H ₇	ILI \rightarrow OLM \rightarrow OLS	0.029	0.023	1.244	0.213	-0.020	0.072	NS
H ₈	LLI \rightarrow OLM \rightarrow OLS	0.101	0.023	4.357	0.000	0.059	0.151	S
H ₉	ISE \rightarrow OLM \rightarrow OLS	0.288	0.035	8.207	0.000	0.224	0.361	S

$t = 8.207$, $p < 0.01$, BCI LL: 0.224, UL: 0.361) mediated the relationship between ISE and OLS (see Table 5).

Hair et al. (2017) and Memon et al. (2017) recommend reporting the coefficient of determination R^2 and the effect size f^2 by describing the significance of the relationships. Here, R^2 refers to the predictive power of the independent variable(s) to predict the dependent variable in a model (Memon et al., 2017); in our case, student satisfaction with online classes in relation to the independent variable OLS. In general, R^2 values of 0.75, 0.50, and 0.25 can be interpreted as being substantial, moderate, and weak (Hair et al., 2011; Hair et al., 2019; Henseler et al., 2009). This study found R^2 of OLM as 0.713 and OLS as 0.788, which signifies that the independent variables DL, ILI, LLI, and ISE can explain 71.3% of the variability in students' OLM and

78.8% of the variability in their OLS during the COVID-19 outbreak (see Figure 2).

Further, f^2 specifies effect size, that is, the extent to which an independent variable contributes to the R^2 of the dependent variable. Cohen (1988) established a rule of thumb, recommending f^2 values higher than 0.35, 0.15, and 0.02 to represent high, medium, and small effect sizes. Following Cohen, the relationships between ILI \rightarrow OLM (H3: $f^2 < 0.02$) and LLI \rightarrow OLS (H8: $f^2 < 0.02$) indicate insignificant effects from the independent variables. However, in other relationships, small to large effects for R^2 of the dependent variables were found. The data were self-reported; therefore, there was the possibility of common method variance (CMV). Employing the Harman single-factor test, it was found that the first factor was responsible for only 47.01%

of the variance, which was lower than the cut-off value 50%; therefore, CMV was not a concern in this study (Podsakoff et al., 2003).

6 | DISCUSSION AND CONTRIBUTION

From the findings, it can be seen that DL has a significant effect on OLM. Students feel that DL is a strong motivator and they prefer to participate in it as they are used to the approach in all their courses. This is the case in the context of developing countries such as Bangladesh, because in doing so they have the opportunity to interact with the instructors directly. Previous studies also support the preference for direct instruction or learning (e.g., Garrison et al., 2000; Goh et al., 2017). We also found that DL has a positive and significant influence on OLS, which is also in line with other studies (Muhsin et al., 2019; Poon & Brownlow, 2015). However, we found a weak mediating relationship between ILI and OLM. Baker (2010) found a positive and significant relationship between instructors' presence and immediacy. Moreover, Baker also found that there was a positive relationship between instructors and learner interaction, and also a linear incorporation of instructor's social presence, which ultimately influences students' learning and motivation. Contrary to the findings of Yukselturk and Yildirim (2008), ours show that there is a significant relationship between ILI and OLS. According to Yukselturk and Yildirim (2008), student satisfaction is one of the most important variables for the success or failure of distance learners; however, student satisfaction fell considerably at the final semester of the programme. On the other hand, in the case of online learning, student satisfaction depends on the course structure, instructor's feedback, self-motivation, learning style, interaction, and instructor's learning facilitation (Eom et al., 2006). We found no significant relationship between LLI and students' overall satisfaction. This was because, in the case of online learning, students are interested in interacting with each other, but this interaction does not affect their overall satisfaction. However, we did find a positive and significant relationship between OLM and OLS. Most research indicates that motivation should be given a higher priority in online learning (K. C. Chen & Jang, 2010). However, according to some studies, motivation does not receive adequate attention in online learning (K. C. Chen & Jang, 2010; Jones & Issroff, 2005). Our study did find a significant relationship between the overall OLM and OLS. As our study was conducted in an emergency situation, namely the COVID-19 pandemic, the popularity of online learning is increasing and students are becoming more involved in the approach. Almost all educational institutions are now adopting online learning systems and implementing instructional guidelines for such learning. The study conducted by Gabrielle (2003) applied Keller's (1983) ARCS (attention, relevance, confidence, and satisfaction) model and found that technology-based online learning was effective to motivate students (K. C. Chen & Jang, 2010); hence their findings also support our model. In another study, Lee (2002) revealed that the two constructs self-efficacy (Bandura, 1982) and task value were significant in predicting students' performance and satisfaction (K. C. Chen & Jang, 2010). Lee's (2002) findings, which are also in line

with our results, suggest that online learning can improve student satisfaction and performance. Biner et al. (1997) found that student satisfaction is an important indicator of the quality of academic programmes, as well as their outcomes (Kuo et al., 2014).

7 | POLICY IMPLICATIONS

Our research found the highest level of variability in students' ISE, with the lowest mean value, which means that students do not have enough knowledge on how to use the Internet for learning and that their level of their confidence varies greatly. However, ISE has a greater impact on both OLM and OLS. Therefore, relevant authorities, such as the Education Ministry, University Grant Commission (UGC), and the universities themselves, should take initiatives to arrange relevant workshops and training programmes to disseminate knowledge on IT and how to use the Internet. Such initiatives will enhance students' ISE. Second, the mean score of the students' satisfaction level in online regular undergraduate and graduate courses is satisfactory, probably because of other situational contexts. These include unreliable networks for accessing the Internet, the need for students to bear the excessive cost of internet connections in order to participate in classes, and the generally poor economic conditions. Therefore, the authorities should address these issues. Faculties could be provided with necessary training on how to conduct online classes and ensure sufficient interaction, because students learn in a very different way online. Moreover, they should be provided with necessary system infrastructure that is appropriate for interaction with and between students. Although we found that LLI is a not significant predictor of OLS, the responsible bodies should develop and design curriculums and course content that allow sufficient interaction and collaboration with co-learners, as the necessity of such interaction among students cannot be ignored.

8 | CONCLUSIONS, LIMITATIONS, AND FUTURE RESEARCH

With the purpose of determining the effect of interaction and ISE on students' OLM and OLS during the COVID-19 outbreak utilizing the PLS-SEM approach, this study found a significant positive impact of DL, ILI, and ISE on OLS, and a significant positive impact of DL, LLI, and ISE on OLM. The study also found a significant mediating role of OLM between DL, LLI, IS, and OLS. The findings have significant implications for the government, UGC as educational policy makers, universities, instructors, and students. It is recommended that online class systems be improved and that online-education-friendly curriculums be developed and the skills of instructors improved to ensure the highest level of interaction during lectures and to continue online education as a culture.

The study has some drawbacks, which should be addressed in future research initiatives. First, since it is only focused on regular students on bachelor's and master's programmes, the findings of this

investigation cannot be generalized to other online learning perspectives, such as MOOCs, regular courses in high schools and colleges, professional courses, and even PhD courses. Second, the implementation of the concept of online education is a very new aspect, adopted to overcome the recent COVID-19 crisis in Bangladesh. Therefore, the researchers had no option but to demonstrate a relative picture of normal pre-COVID-19 conditions that may best articulate the changes taking place. Third, the researchers could only reach a smaller number of postgraduate or master's students, meaning the study may not be representative of the findings from their perspective. Fourth, the research focused on fully online course offerings by universities, although the UGC recently requested university authorities not to hold semester final exams during COVID-19; therefore, the outcomes of the study may only be appropriate to fully online learning environments. Moreover, there have been many webinars and talk shows on the negative sides of online education, which may influence students' evaluations of their satisfaction. Finally, the study used data which to some extent were cross-sectional in nature, and thus may not represent the actual context. Therefore, to avoid these limitations and to generalize the context, other research initiatives could be taken in the future, which consider MOOCs, regular courses in high schools and colleges, and professional and PhD courses. In addition, a further longitudinal study could be conducted in the post-COVID context to identify the changes in the level of student satisfaction with online education if the approach continues. Furthermore, a separate study could be designed for both undergraduate and graduate students. Finally, the inclusion of personal characteristics, demographic profiles, previous online learning experience, university characteristics, nature of course curriculums, and learning support as moderators could influence the relationships between these constructs.

ACKNOWLEDGEMENTS

We like to acknowledge the faculty members from the different universities who cooperated with us to conduct the survey through sharing the research questionnaire to their students. The authors received no fund/grant from any organization to conduct this study.

CONFLICT OF INTEREST

The authors report no conflict of interest.

PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/jcal.12535>.

DATA AVAILABILITY STATEMENT

The data that support the findings of this research are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Md. H Asibur Rahman  <https://orcid.org/0000-0003-1045-1115>

Mohammad Shahab Uddin  <https://orcid.org/0000-0003-3591-7284>

REFERENCES

- Ahamed, Z. (2020, June 10). *Coronavirus: Economy down, poverty up in Bangladesh*. Welle (DW). Retrieved from <https://www.dw.com/en/coronavirus-economy-down-poverty-up-in-bangladesh/a-53759686>
- Alghamdi, A., Karpinski, A. C., Lepp, A., & Barkley, J. (2020). Online and face-to-face classroom multitasking and academic performance: Moderated mediation with self-efficacy for self-regulated learning and gender. *Computers in Human Behavior*, 102, 214–222. <https://doi.org/10.1016/j.chb.2019.08.018>
- Ali, A., & Ahmad, I. (2011). Key factors for determining student satisfaction in distance learning courses: A study of Allama Iqbal Open University (AIU) Islamabad, Pakistan. *Contemporary Educational Technology*, 2(2), 118–134. <https://doi.org/10.30935/cedtech/6047>
- Allen, E., & Seaman, J. (2010). *Learning on demand online education in the United States, 2009*. In Sloan Consortium. Retrieved from <http://files.eric.ed.gov/fulltext/ED529931.pdf>
- Alqurashi, E. (2016). Self-efficacy in online learning environments: A literature review. *Contemporary Issues in Education Research (CIER)*, 9(1), 45–52. <https://doi.org/10.19030/cier.v9i1.9549>
- Alqurashi, E. (2018). Predicting student satisfaction and perceived learning within online learning environments. *Distance Education*, 40(1), 133–148. <https://doi.org/10.1080/01587919.2018.1553562>
- Alqurashi, E. (2019). Predicting student satisfaction and perceived learning within online learning environments. *Distance Education*, 40(1), 133–148. <http://dx.doi.org/10.1080/01587919.2018.1553562>
- Baker, C. (2010). The impact of instructor immediacy and presence for online student affective learning, cognition, and motivation. *The Journal of Educators Online*, 7(1). Retrieved from <https://eric.ed.gov/?id=EJ904072>
- Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84(2), 191–215.
- Bao, W. (2020). COVID -19 and online teaching in higher education: A case study of Peking University. *Human Behavior and Emerging Technologies*, 2(2), 113–115. <https://doi.org/10.1002/hbe2.191>
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37(2), 122–147. <http://dx.doi.org/10.1037/0003-066x.37.2.122>
- Bates, A. W. (2019). *Teaching in a digital age: Guidelines for designing teaching and learning* (2nd ed.). Tony Bates Associates Ltd. Retrieved from <https://openlibrary-repo.ecampusontario.ca/jspui/handle/123456789/276>
- Bekele, T. A. (2010). Motivation and satisfaction in internet-supported learning environments: A review. *Educational Technology & Society*, 13(2), 116–127. <https://doi.org/10.2307/jeductechsoci.13.2.116>
- Betz, E. L., Menne, J. W., Starr, A. M., & Klingensmith, J. E. (1971). A dimensional analysis of college student satisfaction. *Measurement and Evaluation in Guidance*, 4(2), 99–106. <https://doi.org/10.1080/00256307.1971.12022488>
- Biner, P. M., Welsh, K. D., Barone, N. M., Summers, M., & Dean, R. S. (1997). The impact of remote-site group size on student satisfaction and relative performance in interactive telecourses. *American Journal of Distance Education*, 11(1), 23–33. <https://doi.org/10.1080/08923649709526949>
- Biswas, P., & Debnath, A. K. (2020). Worldwide scenario of unplanned transition to e-learning in the time of covid-19 and students' perception: A review. *Mukt Shabd Journal*, IX(v), 2038–2043.
- Bolliger, D. U., & Martindale, T. (2004). Key factors for determining student satisfaction in online courses. *International Journal on E-Learning*, 3(1), 61–67. <https://doi.org/10.5771/9783845279893-1090-1>
- Brooker, A., Corrin, L., de Barba, P., Lodge, J., & Kennedy, G. (2018). A tale of two MOOCs: How student motivation and participation predict learning outcomes in different MOOCs. *Australasian Journal of Educational Technology*, 34(1), 73–87. <https://doi.org/10.14742/ajet.3237>
- Burnett, K., Bonnici, L. J., Miksa, S. D., & Kim, J. (2007). Frequency, intensity and topicality in online learning: An exploration of the

- interaction dimensions that contribute to student satisfaction in online learning. *Journal of Education for Library and Information Science*, 48(1), 21–35.
- Chang, I. Y., & Chang, W. Y. (2012). The effect of student learning motivation on learning satisfaction. *International Journal of Organizational Innovation*, 4(3), 281–305.
- Chen, K. C., & Jang, S. J. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behavior*, 26(4), 741–752. <https://doi.org/10.1016/j.chb.2010.01.011>
- Chen, T., Peng, L., Yin, X., Rong, J., Yang, J., & Cong, G. (2020). Analysis of user satisfaction with online education platforms in China during the COVID-19 pandemic. *Healthcare (Basel, Switzerland)*, 8(3). <https://doi.org/10.3390/healthcare8030200>
- Cohen, J. (1988). Statistical power analysis for the behavioral sciences. In *Erlbaum association* (2nd ed.). Lawrence Erlbaum Associates.
- Eichelberger, A., & Ngo, H. T. P. (2018). College students' perception of an online course in special education. *International Journal for Educational Media and Technology*, 12(2), 11–19.
- Elizondo-Garcia, J., & Gallardo, K. (2020). Peer feedback in learner-learner interaction practices. Mixed methods study on an xMOOC. *Electronic Journal of E-Learning*, 18(2), 122–135. <https://doi.org/10.34190/EJEL.20.18.2.002>
- Eom, S. B., Wen, H. J., & Ashill, N. (2006). The determinants of students' perceived learning outcomes and satisfaction in university online education: An empirical investigation. *Decision Sciences Journal of Innovative Education*, 4(2), 215–235. <https://doi.org/10.1111/j.1540-4609.2006.00114.x>
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement errors. *Journal of Marketing Research*, 18(1), 39–50. <https://doi.org/10.1177/002224378101800313>
- Gabrielle, D. (2003). The effects of technology-mediated instructional strategies on motivation. In D. Lassner & C. McNaught (Eds.), *EdMedia + Innovate Learning* (Vol. 2003, pp. 2568–2575). Association for the Advancement of Computing in Education (AACE). Retrieved from <https://www.learnlib.org/p/14267/>
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *Internet and Higher Education*, 2(2–3), 87–105. [https://doi.org/10.1016/S1096-7516\(00\)00016-6](https://doi.org/10.1016/S1096-7516(00)00016-6)
- Gee, N. C. (2018). The impact of lecturers' competencies on students' satisfaction. *Journal of Arts and Social Sciences*, 1(2), 74–86.
- Goh, C. F., Leong, C. M., Kasmin, K., Hii, P. K., & Tan, O. K. (2017). Students' experiences, learning outcomes and satisfaction in e-learning. *Journal of E-Learning and Knowledge Society*, 13(2), 117–128. <https://doi.org/10.20368/1971-8829/1298>
- Gold, A. H., Malhotra, A., & Segars, A. H. (2001). Knowledge management: An organizational capabilities perspective. *Journal of Management Information Systems*, 18(1), 185–214. <https://doi.org/10.1080/07421222.2001.11045669>
- Gray, J. A., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation*, 11(1), 98–119.
- Hair, J. F., Black, W., Babin, B., & Anderson, R. (2010). *Multivariate data analysis: A global perspective*. Pearson Education Inc.
- Hair, J. F., Hult, G. T. M., & Ringle, C. M. (2014). *Partial least squares structural equation modeling (PLS-SEM)*. SAGE Publications, Inc.
- Hair, J. F., Hult, G. T. M., & Ringle, C. M. (2017). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). SAGE.
- Hair, J. F., Ringle, C. M., & Sarstedt, M. (2011). PLS-SEM: Indeed a silver bullet. *Journal of Marketing Theory and Practice*, 19(2), 139–152. <https://doi.org/10.2753/MTP1069-6679190202>
- Hair, J. F., Risher, J. J., Sarstedt, M., & Ringle, C. M. (2019). When to use and how to report the results of PLS-SEM. *European Business Review*, 31(1), 2–24. <https://doi.org/10.1108/EBR-11-2018-0203>
- Harris, H. S., & Martin, E. W. (2012). Student motivations for choosing online classes. *International Journal for the Scholarship of Teaching and Learning*, 6(2). <https://doi.org/10.20429/ijstol.2012.060211>
- Henseler, J., Ringle, C. M., & Sarstedt, M. (2014). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, 43(1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In R. R. Sinkovics & P. N. Ghauri (Eds.), *New challenges to international marketing* (Vol. 20, pp. 277–319). Emerald Group Publishing Limited. Retrieved from [https://doi.org/10.1108/S1474-7979\(2009\)0000020014](https://doi.org/10.1108/S1474-7979(2009)0000020014)
- Herrington, J., Reeves, T. C., & Oliver, R. (2006). Authentic tasks online: A synergy among learner, task, and technology. *Distance Education*, 27(2), 233–247. <https://doi.org/10.1080/01587910600789639>
- Heyman, E. (2010). Overcoming student retention issues in higher education online programs. *Online Journal of Distance Learning Administration*, 13(4).
- Hsu, H. C. K., Wang, C. V., & Levesque-Bristol, C. (2019). Reexamining the impact of self-determination theory on learning outcomes in the online learning environment. *Education and Information Technologies*, 24(3), 2159–2174. <https://doi.org/10.1007/s10639-019-09863-w>
- Hsu, P. C., Chang, I. H., & Chen, R. S. (2020). Early childhood educators' attitudes to internet self-efficacy and internet-related instructional applications: The mediating effects of internet enjoyment and professional support. *SAGE Open*, 10(1). <https://doi.org/10.1177/2158244020914390>
- Huang, Y. C., Backman, S. J., Backman, K. F., McGuire, F. A., & Moore, D. W. (2019). An investigation of motivation and experience in virtual learning environments: A self-determination theory. *Education and Information Technologies*, 24(1), 591–611. <https://doi.org/10.1007/s10639-018-9784-5>
- Igbaria, M., Iivari, J., & Maragahh, H. (1995). Why do individuals use computer technology? A Finnish case study. *Information and Management*, 29(5), 227–238. [https://doi.org/10.1016/0378-7206\(95\)00031-0](https://doi.org/10.1016/0378-7206(95)00031-0)
- Jasim, M. M., & Sajid, E. (2020, June 23). Costly data, poor connection key challenges for online classes in public universities. *The Business Standard*. Retrieved from <https://tbsnews.net/bangladesh/education/costly-data-poor-connection-key-challenges-online-classes-public-universities>
- Jones, A., & Issroff, K. (2005). Learning technologies: Affective and social issues in computer-supported collaborative learning. *Computers and Education*, 44(4), 395–408. <https://doi.org/10.1016/j.compedu.2004.04.004>
- Keller, J. M. (1983). Motivational design of instruction. In C. M. Reigeluth (Ed.), *Instructional-design theories and models: An overview of their current status* (Vol. 1, pp. 383–434). Psychology Press.
- Keskin, S., & Yurdugül, H. (2020). Factors affecting students' preferences for online and blended learning: Motivational vs. cognitive. *European Journal of Open, Distance and E-Learning*, 22(2), 72–86. <https://doi.org/10.2478/eurodl-2019-0011>
- Kline, R. B. (2015). In D. A. Kenny & T. D. Little (Eds.), *Principles and practice of structural equation modeling* (4th ed.). The Guilford Press. Retrieved from <https://doi.org/10.1017/CBO9781107415324.004>
- Kuo, Y. C., & Belland, B. R. (2019). Exploring the relationship between African American adult learners' computer, Internet, and academic self-efficacy, and attitude variables in technology-supported environments. *Journal of Computing in Higher Education*, 31(3), 626–642. <https://doi.org/10.1007/s12528-019-09212-3>
- Kuo, Y.-C., Walker, A., & Schroder, K. (2010). Interaction and other variables as predictors of student satisfaction in online learning environments. In D. Gibson & B. Dodge (Eds.), *Society for Information Technology & Teacher Education International Conference* (pp. 593–600). Association for the Advancement of Computing in Education (AACE).

- Kuo, Y. C., Walker, A. E., Belland, B. R., & Schroder, K. E. E. (2013). A predictive study of student satisfaction in online education programs. *International Review of Research in Open and Distance Learning*, 14(1), 16–39. <https://doi.org/10.19173/irrodl.v14i1.1338>
- Kuo, Y.-C., Walker, A. E., Schroder, K. E. E., & Belland, B. R. (2014). Interaction, internet self-efficacy, and self-regulated learning as predictors of student satisfaction in online education courses. *Internet and Higher Education*, 20, 35–50. <https://doi.org/10.1016/j.iheduc.2013.10.001>
- Kurucay, M., & Inan, F. A. (2017). Examining the effects of learner-learner interactions on satisfaction and learning in an online undergraduate course. *Computers and Education*, 115, 20–37. <https://doi.org/10.1016/j.compedu.2017.06.010>
- Lee, J. W. (2010). Online support service quality, online learning acceptance, and student satisfaction. *Internet and Higher Education*, 13(4), 277–283. <https://doi.org/10.1016/j.iheduc.2010.08.002>
- Lee, C.-Y. (2002). The impact of self-efficacy and task value on satisfaction and performance in a Web-based course. PhD Thesis, University of Central Florida, <https://www.proquest.com/docview/305439173>
- Liang, J. C., & Tsai, C. C. (2008). Internet self-efficacy and preferences toward constructivist Internet-based learning environments: A study of pre-school teachers in Taiwan. *Educational Technology & Society*, 11(1), 226–237.
- Liang, J. C., & Wu, S. H. (2010). Nurses' motivations for web-based learning and the role of internet self-efficacy. *Innovations in Education and Teaching International*, 47(1), 25–37. <https://doi.org/10.1080/14703290903525820>
- Liao, P. W., & Hsieh, J. Y. (2011). What influences internet-based learning? *Social Behavior and Personality*, 39(7), 887–896. doi.org/10.2224/sbp.2011.39.7.887
- Liaw, S. S. (2008). Investigating students' perceived satisfaction, behavioral intention, and effectiveness of e-learning: A case study of the Blackboard system. *Computers and Education*, 51(2), 864–873. <https://doi.org/10.1016/j.compedu.2007.09.005>
- Liaw, S. S., Huang, H. M., & Chen, G. D. (2007). An activity-theoretical approach to investigate learners' factors toward e-learning systems. *Computers in Human Behavior*, 23(4), 1906–1920. <https://doi.org/10.1016/j.chb.2006.02.002>
- Listyaningrum, D., Handoyo, S. S., & Murtinugraha, R. E. (2016). Pengaruh Kinerja Mengajar Dosen Terhadap Kepuasan Belajar Mahasiswa Program Studi Pendidikan Teknik Bangunan Fakultas Teknik UNJ. *Jurnal Pensil*, 5(2), 88–98. <https://doi.org/10.21009/jpensil.v5i2.7251>
- Memon, M. A., Sallaeh, R., Baharom, M. N. R., Nordin, S. M., & Ting, H. (2017). The relationship between training satisfaction, organisational citizenship behaviour, and turnover intention: A PLS-SEM approach. *Journal of Organizational Effectiveness: People and Performance*, 4(3), 267–290. <https://doi.org/10.1108/JOEPP-03-2017-0025>
- Moore, J. (2014). Effects of online interaction and instructor presence on students' satisfaction and success with online undergraduate public relations courses. *Journalism and Mass Communication Educator*, 69(3), 271–288. <https://doi.org/10.1177/1077695814536398>
- Moore, J. C. (2005). *The Sloan consortium quality framework and the five pillars*. Needham, MA: The Sloan consortium. <http://citeseerx.ist.psu.edu/viewdoc/download?sessionid=AB830A35E56121F2F18BAEDC1B347BB1&doi=10.1.1.593.4504&rep=rep1&type=pdf>
- Moore, M. G. (1989). Editorial: Three types of interaction. *American Journal of Distance Education*, 3(2), 1–7. <https://doi.org/10.1080/08923648909526659>
- Muhsin, M. S., Nurkhin, A., Pramusinto, H., Afsari, N., & Arham, A. F. (2019). The relationship of good university governance and student satisfaction. *International Journal of Higher Education*, 9(1). <https://doi.org/10.5430/ijhe.v9n1p1>
- Osman, A. R., & Saputra, R. S. (2019). A pragmatic model of student satisfaction: A viewpoint of private higher education. *Quality Assurance in Education*, 27(2), 142–165. <https://doi.org/10.1108/QAE-05-2017-0019>
- Podsakoff, P. M., MacKenzie, S. B., Lee, J. Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879–903. <https://doi.org/10.1037/0021-9010.88.5.879>
- Poon, J., & Brownlow, M. (2015). Real estate student satisfaction in Australia: What matters most? *Property Management*, 33(2), 100–132. <https://doi.org/10.1108/PM-05-2014-0023>
- Prifti, R. (2020). Self-efficacy and student satisfaction in the context of blended learning courses. *Open Learning*, 00(00), 1–15. <https://doi.org/10.1080/02680513.2020.1755642>
- Puzziferro, M. (2008). Online technologies self-efficacy and self-regulated learning as predictors of final grade and satisfaction in college-level online courses. *International Journal of Phytoremediation*, 21(1), 72–89. <https://doi.org/10.1080/08923640802039024>
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, 55(1), 68–78. <https://doi.org/10.1037/0003-066X.55.1.68>
- Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, 61, 101860. <https://doi.org/10.1016/j.cedpsych.2020.101860>
- Shea, P., & Bidjerano, T. (2010). Learning presence: Towards a theory of self-efficacy, self-regulation, and the development of a communities of inquiry in online and blended learning environments. *Computers and Education*, 55(4), 1721–1731. <https://doi.org/10.1016/j.compedu.2010.07.017>
- Shi, J., Chen, Z., & Tian, M. (2011). Internet self-efficacy, the need for cognition, and sensation seeking as predictors of problematic use of the internet. *Cyberpsychology, Behavior, and Social Networking*, 14(4), 231–234. <https://doi.org/10.1089/cyber.2009.0462>
- Soffer, T., & Nachmias, R. (2018). Effectiveness of learning in online academic courses compared with face-to-face courses in higher education. *Journal of Computer Assisted Learning*, 34(5), 534–543. <https://doi.org/10.1111/jcal.12258>
- Street, H. (2010). Factors influencing a learner's decision to drop-out or persist in higher education distance learning. *Online Journal of Distance Learning Administration*, 13(4).
- Tan, S., Chuah, F., & Ting, H. (2016, October). *Factors affecting university students' satisfaction on online learning system*. Paper presented at TARC International Conference On Learning & Teaching 2016, 2016 (TRAC) (pp. 17–20).
- Tawfik, A. A., Reeves, T. D., Stich, A. E., Gill, A., Hong, C., McDade, J., & Giabbanelli, P. J. (2017). The nature and level of learner-learner interaction in a chemistry massive open online course (MOOC). *Journal of Computing in Higher Education*, 29(3), 411–431. <https://doi.org/10.1007/s12528-017-9135-3>
- Thai, N. T. T., De Wever, B., & Valcke, M. (2017). The impact of a flipped classroom design on learning performance in higher education: Looking for the best “blend” of lectures and guiding questions with feedback. *Computers and Education*, 107, 113–126. <https://doi.org/10.1016/j.compedu.2017.01.003>
- Toven-Lindsey, B., Rhoads, R. A., & Lozano, J. B. (2015). Virtually unlimited classrooms: Pedagogical practices in massive open online courses. *Internet and Higher Education*, 24, 1–12. <https://doi.org/10.1016/j.iheduc.2014.07.001>
- Tseng, H., Kuo, Y. C., & Walsh, E. J. (2020). Exploring first-time online undergraduate and graduate students' growth mindsets and flexible thinking and their relations to online learning engagement. *Educational Technology Research and Development*, 68, 2285–2303. <https://doi.org/10.1007/s11423-020-09774-5>
- Vayre, E., & Vonthron, A. M. (2019). Relational and psychological factors affecting exam participation and student achievement in online college courses. *Internet and Higher Education*, 43. <https://doi.org/10.1016/j.iheduc.2018.07.001>
- Wang, C., Horby, P. W., Hayden, F. G., & Gao, G. F. (2020). A novel coronavirus outbreak of global health concern. *The Lancet*, 395(10223), 470–473. [https://doi.org/10.1016/S0140-6736\(20\)30185-9](https://doi.org/10.1016/S0140-6736(20)30185-9)

- Wang, Q. (2008). A generic model for guiding the integration of ICT into teaching and learning. *Innovations in Education and Teaching International*, 45(4), 411–419. <https://doi.org/10.1080/14703290802377307>
- Wei, H. C., & Chou, C. (2020). Online learning performance and satisfaction: Do perceptions and readiness matter? *Distance Education*, 41(1), 48–69. <https://doi.org/10.1080/01587919.2020.1724768>
- World Health Organization. (2020). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. Retrieved from WHO Director General's speeches website: <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-mission-briefing-on-covid-19-12-march-2020>
- Yang, J. C., Quadir, B., Chen, N. S., & Miao, Q. (2016). Effects of online presence on learning performance in a blog-based online course. *Internet and Higher Education*, 30, 11–20. <https://doi.org/10.1016/j.iheduc.2016.04.002>
- Yukselturk, E., & Yildirim, Z. (2008). Investigation of interaction, online support, course structure and flexibility as the contributing factors to students' satisfaction in an online certificate program. *Educational Technology & Society*, 11(4), 51–65.
- Zhang, W., Wang, Y., Yang, L., & Wang, C. (2020). Suspending classes without stopping learning: China's education emergency management policy in the COVID-19 Outbreak. *Journal of Risk and Financial Management*, 13(3), 55. <https://doi.org/10.3390/jrfm13030055>
- Zhou, M. (2016). Chinese university students' acceptance of MOOCs: A self-determination perspective. *Computers & Education*, 92–93, 194–203. <https://doi.org/10.1016/j.compedu.2015.10.012>
- Zhu, Y., Zhang, J. H., Au, W., & Yates, G. (2020). University students' online learning attitudes and continuous intention to undertake online courses: A self-regulated learning perspective. In *Educational technology research and development* (Vol. 68). Springer US. Retrieved from <https://doi.org/10.1007/s11423-020-09753-w>

How to cite this article: Rahman MHA, Uddin MS, Dey A. Investigating the mediating role of online learning motivation in the COVID-19 pandemic situation in Bangladesh. *J Comput Assist Learn*. 2021;1–15. <https://doi.org/10.1111/jcal.12535>

APPENDIX: MEASUREMENT ITEMS

Direct instructions

1. My instructor provides useful illustrations that help to make the course content more understandable to me.
2. My instructor presents helpful examples that allows me to better understand the content of the course.
3. My instructor provides clarifying explanations or other feedback that allows me to better understand the content of the course.

Learner-instructor interactions

1. I have numerous interactions from the instructor during the class.
2. I always ask my questions to the instructors' using different electronic means, such as email, discussion boards, video conferencing (Zoom, Google Hangouts, Skype & Cisco WebEx), instant messaging tools (Facebook Messenger, WhatsApp), etc.
3. My instructor regularly posts some questions for us to discuss on the discussion board.
4. My instructor always replies my questions in a timely fashion.
5. I always reply to messages from my instructors.
6. I always receive enough feedback from my instructors when I need it.

Learner-learner interactions

1. I get required interactions and support for my class projects from my classmates.
2. I receive lots of feedback from my classmates.
3. I communicate with my classmates about the course content through different electronic means, such as email, discussion boards, video conferencing (Zoom, Google Hangouts, Skype & Cisco WebEx), instant messaging tools (Facebook Messenger, WhatsApp), etc.
4. I always answer questions asked by my classmates through different electronic means, such as email, discussion board, instant messaging tools, etc.
5. I always share my thoughts or ideas about the lectures and its application with other students during online classes.
6. During online classes, I always comment on the other students' thoughts and ideas.
7. I get real time interaction during online classes and can participate in class group activities.
8. Overall, I get numerous interactions related to the course content with fellow students.

Perceived self-efficacy (Internet self-efficacy)

1. I feel confident using the e-learning system.

2. I feel confident in operating e-learning functions.

3. I feel confident using online learning contents.

Online learning motivation

1. The overall costs motivate me to take online classes during the Covid-19.
2. I feel online classes are as convenient as traditional class room.
3. I feel the overall environment is favorable and motivate me to take online classes during the Covid-19.
4. I feel at home (comfortable) in participating in online classes.
5. I feel the flexible time/class schedule is an important for me to take online classes.
6. I feel secure participating in online classes as I can avoid campus violence among different students' wings/political wings.
7. The interesting course design also motivate to participate online classes.
8. I feel secure to participate in online classes as I don't have to worry regarding my online privacy/data privacy/hacking.
9. I get the necessary support from my family members to ensure the learning environment in participating in online classes.
10. I feel my family don't misunderstand me considering I am wasting time going online (visiting unwanted sites).
11. The real time online resources are also important and motivate me to take online classes.
12. Uninterrupted power supply and internet availability motivate me to take online classes.
13. I really enjoy online classes during Covid-19.

Student's online learning satisfaction

1. I am satisfied with the online instructional styles of the instructors during Covid-19.
2. I am satisfied with the learning contents and course structure designed for online classes during Covid-19.
3. I am satisfied with the instructors and teaching assistants (if any).
4. I am satisfied with the use of online discussion forum during Covid-19.
5. I am satisfied with the group projects for the course assignment and the criteria for group projects during Covid-19.
6. I am satisfied with the exams conducted online during Covid-19.
7. Overall, I am satisfied with online classes during Covid-19.

(Continues)